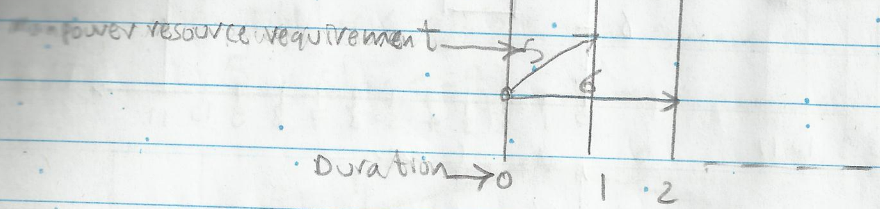
5 - Network scheduling with limited resources

* Representation:

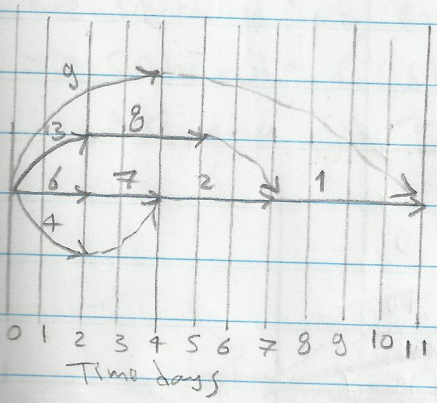


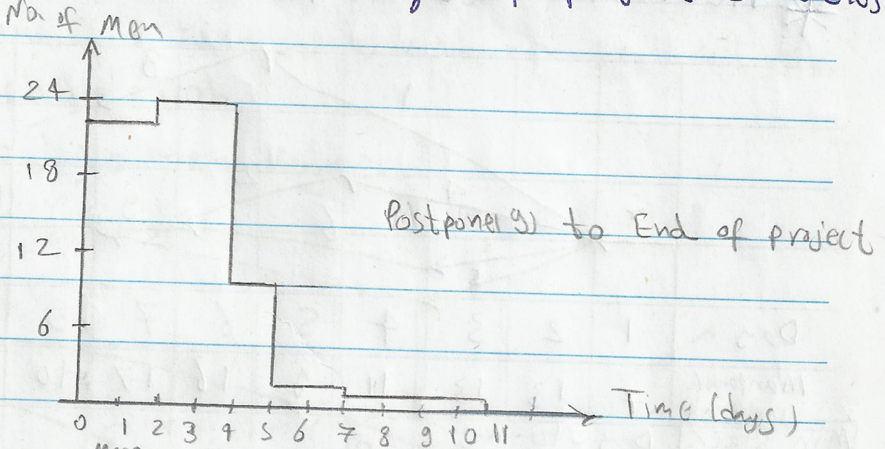
* Types of programs:

1- Resource leveling programs: Reduce peak resource requirement and smooth out period-to-period assignments with a constraint on project duration

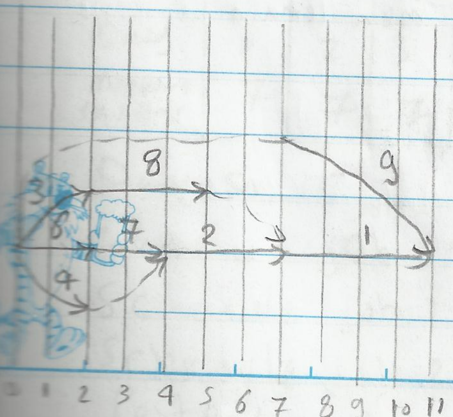
2- Resource allocation programs: Allocate available resources to project activities to decrease time with a constraint on resources limits

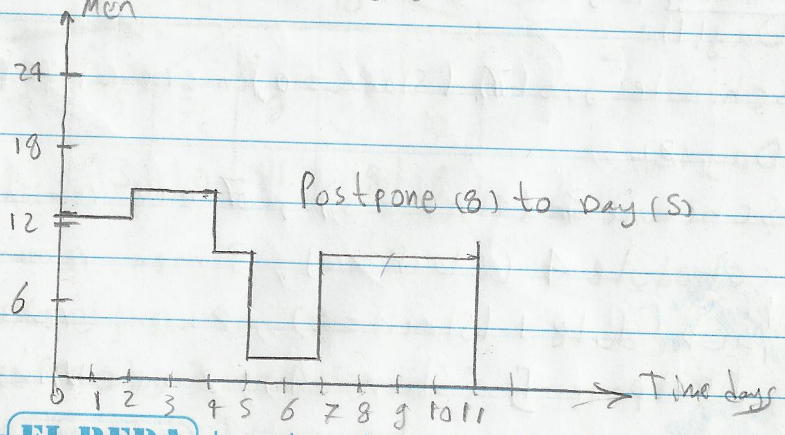
* Heuristic methods for resource leveling of project schedules:



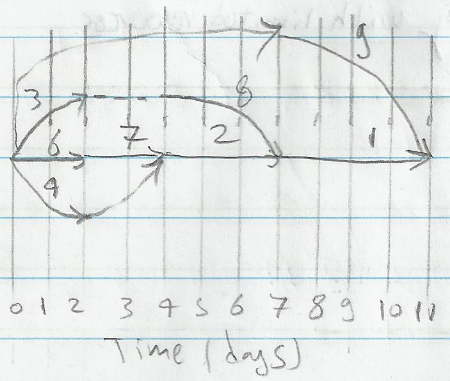


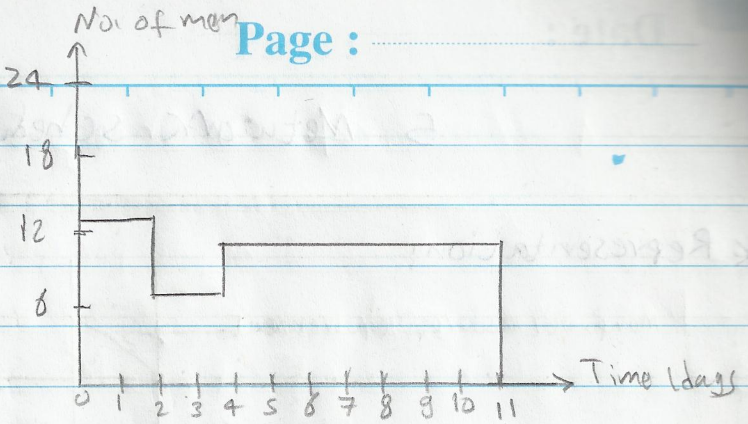
Postpone (9) to End of project

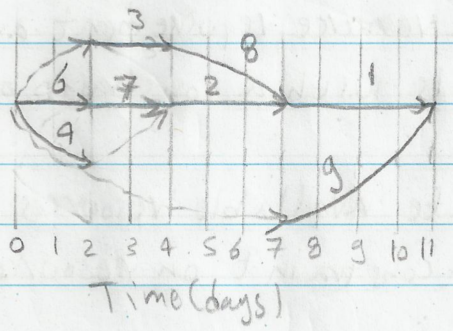


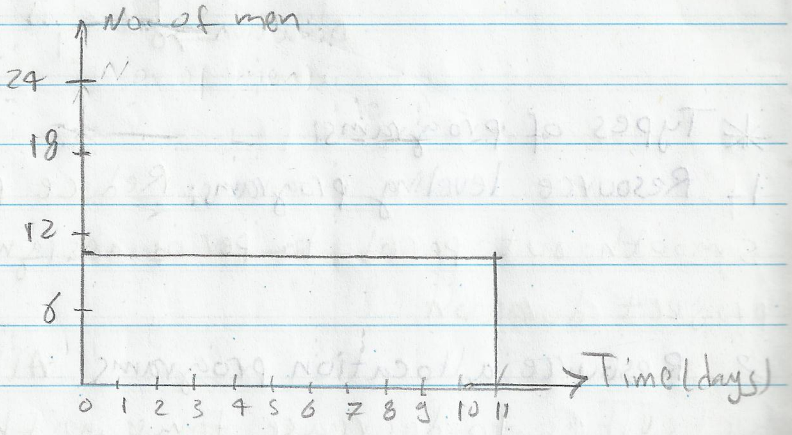


Postpone (8) to Day (5)



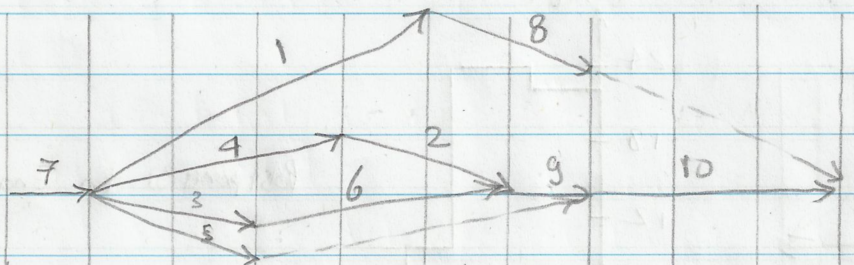






* Heuristic methods for resource allcation in project schedul

10 men available /day



Day	1	2	3	4	5	6	7	8	9	10
Manpower requirements	7	13	13	11	9	16	17	10	10	10

Min slack Day-to-day

- Day (1):

$10-7$

Schedule job 7 (slack = 0, on critical path; 3 men remain

- Day (2)

Schedule 3 (slack = 0), 7 men remain

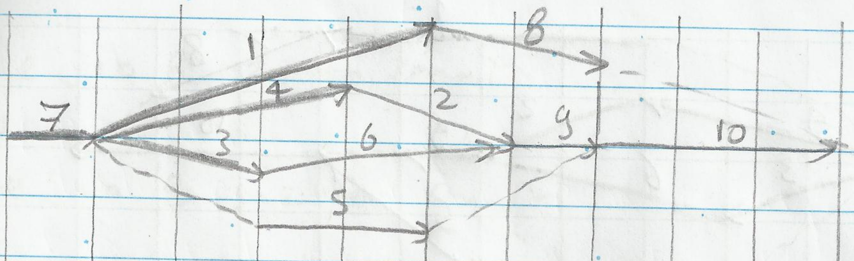
Schedule 4 (slack = 0), 3 men remain

Schedule 1 (slack = 3), 2 men remain

Postpone 5 (slack = 4); 2 men unassigned

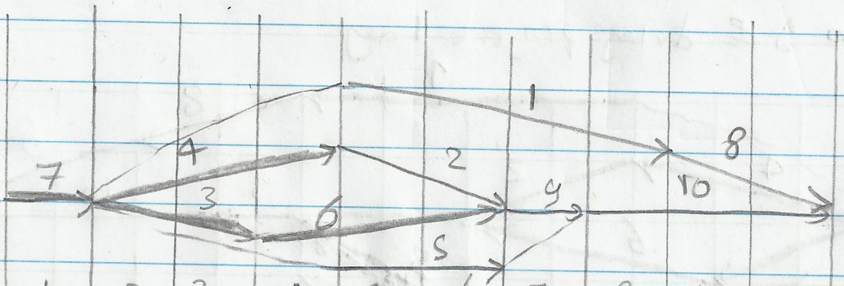
— Day (3):

Continue job 3 (slack=0); 7 men remain
Continue job 4 (slack=0); 3 men remain
Continue job 1 (slack=3); 2 men remain
Postpone job 5 (slack=4); 2 men unassigned



Day	1	2	3	4	5	6	7	8	9	10
Manpower requirements	7	8	8	16	14	16	17	10	10	10

— Day (4):
Continue job 4 (slack=0); 6 men remain
Continue job 1 (slack=3); 5 men remain
job 6 couldn't be postponed (critical job) and non-critical jobs are scheduled first, so reschedule job 1
⇒ schedule 6 (slack=0); 0 men remain
Postpone job 5 (slack=2)



Day	1	2	3	4	5	6	7	8	9	10
Manpower requirements	7	7	7	10	13	13	10	11	18	18

— Day (5):
Continue job 6 (slack=0); 4 men remain
Schedule job 1 (slack=0); 3 men remain
Schedule job 2 (slack=0); 1 man remain
Postpone job 5 (slack=1); 1 man unassigned

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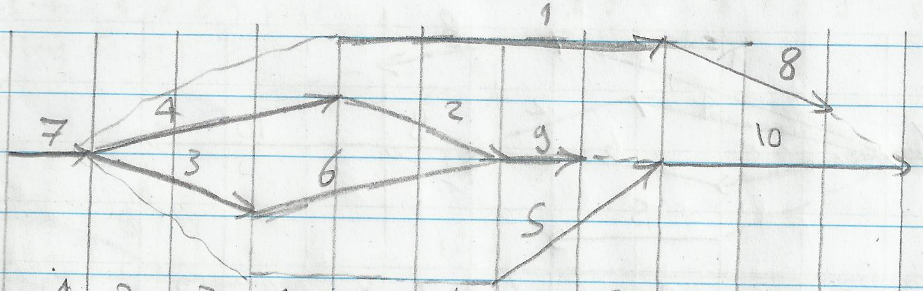
- Day (6);

Continue job 6 (Slack = 0) ; 4 men remain
Continue job 1 (Slack = 0) ; 3 men remain
Continue job 2 (Slack = 0) ; 1 man remains
⇒ Project should be delayed to postpone job 5 one day



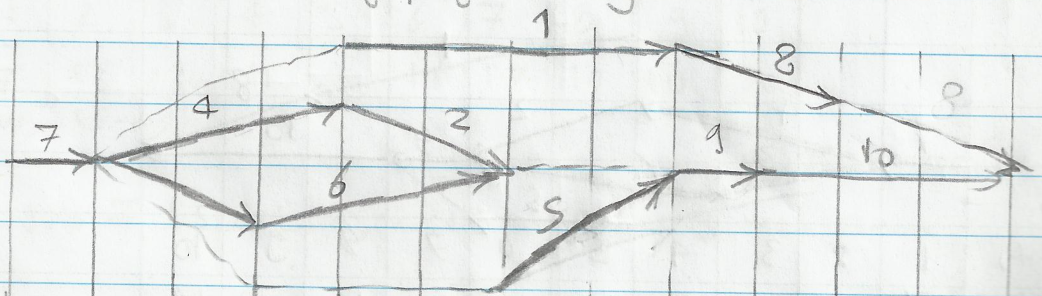
Day	1	2	3	4	5	6	7	8	9	10	11
Manpower requirements	7	7	7	10	9	9	15	6	18	18	10

- Day (7);

Continue job 1 (Slack = 1) ; 9 men remain
Schedule job 5 (Slack = 0) ; 4 men remain
Postpone job 9 (Slack = 1) ; 4 men unassigned

- Day (8)

Continue job 1 (Slack = 1) ; 9 men remain
Continue job 5 (Slack = 0) ; 4 men
⇒ Postpone job 9 & delay project 1 day



Day	1	2	3	4	5	6	7	8	9	10	11	12
Manpower requirement												

- Day (9)

Schedule job 9 ; 1 man remain
Postpone job 8 ; 1 man unassigned

- Day (10)

Schedule job 10 ; 0 man remain
Postpone job 8

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Day (11)

Continue job 10 ; 0 man remains

Postpone job 8 & delay project 1 day

Day (12)

Continue job 10 ; 0 man remains

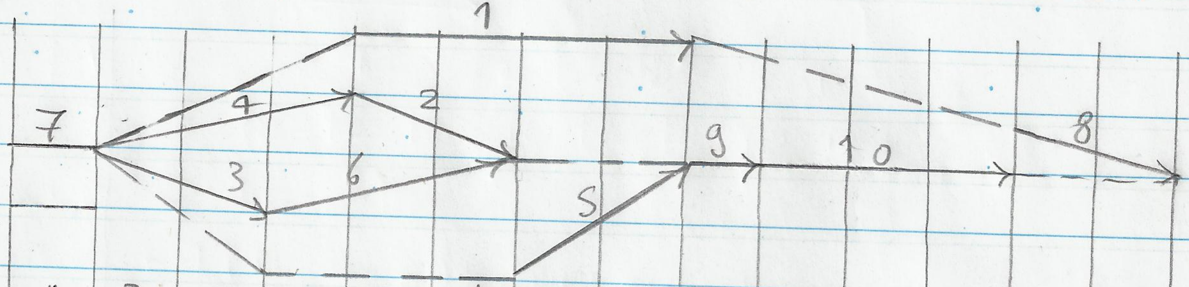
Postpone job 8 & delay project 1 day

Day (13)

Schedule job 8 ; 2 men remain

Day (14)

Continue job 8 ; 2 men remain



Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Manpower requirement	7	7	7	10	9	9	6	6	9	10	10	10	8	8